

## Physics 1320L

Section x, CRN:nnnnnn

Fall, 2024

Workman 107

Day, time

**Instructor:** Instructor Name.

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**Office Hours:** Days, hours; other times by appointment.

**Course Description:** Experiments from the subject matter of PHYS 1320.

This course addresses a cross-section of the concepts introduced in the lecture. It introduces techniques for obtaining and analyzing experimental observations using diverse methods and equipment.

In general, students are asked to report their activities and results clearly and concisely in formats ranging from "worksheets" to a formal Lab report write-up. The time spent outside Lab on preparation, data analysis, and presentation will vary somewhat, but an average of up to three hours of outside work per Lab is encouraged.

**Pre-requisites:** Phys-1310

**Co-requisites:** Phys-1320

**Grading:** The final grade is composed as follows:

Lab Reports	50%
Worksheets	50%

A 100-point scale is used to grade papers and worksheets; points are converted to the NMT letter grading system (published in the current catalog) using the following table.

Letter Grade	F	D	D+	C-	C	C+	B-	B	B+	A-	A
100-point scale	[0,59]	[60,67]	[67,69]	[70,72]	[73,76]	[77,79]	[80,82]	[83,86]	[87,89]	[90,92]	[93,100]

**Mode of Instruction:** This Lab is delivered face-to-face.

**Course Schedule:** Laboratory exercises are performed weekly. Their sequence is given in the Lab Manual. Preliminary material is covered during the first week of classes; the first Lab is performed during the second week.

**Place in Curriculum:** This course is a General Education Core requirement in Science. It corresponds to New Mexico Area III and satisfy Essential Skills in Quantitative Reasoning, Critical Thinking, and Personal and Social Responsibilities.

**Course Learning Outcomes:** By the end of this course, it is expected that students will have acquired first-hand knowledge of the fundamental principles of electro and magnetostatic phenomena. In addition, the students should have learned basic techniques for obtaining and analyzing experimental data in a manner consistent with academic integrity.

**Program Learning Outcomes:** Apply quantitative analysis to scientific problems and Communicate scientific information.

**Course Requirements:** The required Lab Manual is provided to you; it has all the relevant information to perform each Lab. You are expected to read it before the Lab and bring it to the Lab. You are also expected to bring a laptop computer to perform some of the data analysis. Be ready to work with all needed materials (pencils, notebooks, Laboratory Manual, personal computer, etc.).

For safety, No food is allowed in the Lab; beverages should be carried in spill-proof containers. You are also expected to follow the instructions for each Lab carefully. Furthermore, It is required that you comply with the COVID-19 procedures given below to reduce the risk of transmission in the Lab. Make sure you read and understand them.

Attendance is mandatory. Punctuality in attendance and completion of all assignments on time is required. You are expected to submit your reports a week after the Lab is completed.

Rotation of individual roles in a team is required to ensure everyone's participation in the exercises. Ensure your Instructor signs off your raw data before leaving the Lab.

Approach all issues with professional courtesy and respect the efforts, opinions, and property of others. Disruptive behavior, including horseplay and reckless use of equipment, will NOT be tolerated.

To minimize disruptions in the Lab, you are required to abide by the following rules of etiquette. Cell phones should be reserved for emergencies –no text. If you must accept a call, please take it outside the Lab. If you are late to the Lab, please keep the disruption to a minimum while joining your team. Abusers may be asked to leave the Lab.

### **Policies:**

- The lowest grade on a worksheet is not counted toward the final grade. In contrast, all grades from Lab reports are counted.
- Lab reports are graded according to the rubric posted on CANVAS.
- In general, there are no makeup labs, but the Instructor may grant a request under extenuating circumstances.
- Under no circumstances are students allowed to take the Lab with a different TA –this is a FERPA violation.
- Excused absences. To be an excused absence, a legitimate note (e.g., a Medical note.) has to be submitted to the Instructor. At the Instructor's discretion, the student can prepare and submit the corresponding Report or Worksheet using only Instructor's provided data. No penalty is assessed in this case.

- Unexcused absences. Depending on the specific case, at the Instructor's discretion, the student may be allowed to submit the corresponding Report or Worksheet using only Instructor's provided data. In this case, however, a report can earn at most 80% of the grade, while worksheets only 50%.
- Late work. Lab work submitted late for grading but not more than a week past due will be accepted but will earn at most 80% of the grade. No lab work past due more than a week will be generally accepted, but at the Instructor's discretion, it may be accepted under extenuating circumstances.
- The use of generative AI tools (e.g. ChatGPT, Dall-e) is only permitted in this course for checking grammar and style. All other uses (e.g. Producing drafts for writing assignment, writing entire paragraphs or papers to complete assignments) are not permitted and violations to the academic honesty Policy.

**NMT Academic Honesty:** New Mexico Tech's Academic Honesty Policy for undergraduate and graduate students is found in the catalog, which can be found at:

<https://www.nmt.edu/registrar/catalogs.php/>.

Further information about academic honesty can be found on the Associate Vice President for Academic Affairs website:

[https://www.nmt.edu/academicaffairs/avppa/academic\\_honesty.php](https://www.nmt.edu/academicaffairs/avppa/academic_honesty.php) .

You are responsible for knowing, understanding, and following this policy.

Laboratory exercises are a group effort, and discussing the material with each other is encouraged. Unless your Instructor specifically directs sharing data with other teams, only data you collect with your team can be shared within the team, which must be acknowledged. Giving or receiving data for your analysis from any other source is not permissible. Data obtained during the lab session is expected to be the same within each group (tables, graphs, etc.). However, your written assignment must be your own work; any help received must be acknowledged, and proper citations of the utilized sources must be included. Plagiarism is not tolerated. Any suspicion of a violation of the letter or intent of the NMT policy will be reported to the Lab Director, who will determine the appropriate charges to bring to the Office of the Associate Vice President for Academic Affairs. In general, obtaining answers that, in any way, bypass the need to think about the assignment is a violation of the academic honesty policy and can have serious consequences. If in doubt, please ask your Instructor before submitting any work as your own.

## New Mexico Tech Services and Policy

### Student Resources

Wondering where to go for help? Please see the offices below or visit the "Where NMT Students Should Go for Help" website.

**NMT Academic Honesty:** New Mexico Tech's Academic Honesty Policy for undergraduate and graduate students is found in the student handbook, which can be found at:

<https://www.nmt.edu/studenthandbook/>. You are responsible for knowing, understanding, and following this policy.

**Student Success:** New Mexico Tech offers numerous peer tutoring services for students who are struggling in their courses, or who just wish to receive friendly advice, including the Office of Student Learning (Skeen Library, <https://www.nmt.edu/osl/>), Math Helproom (<https://www.nmt.edu/academics/math/ugrad/mathhelproom.php>), the Writing and Communication Lab (Skeen Library, <https://www.nmt.edu/academics/class/center.php>), and numerous department-run centers. These services are free of charge to students! Students may also consult the Dean for Student Success Initiatives, Elaine Debrine Howell (Fidel, rm. 237; 575-835-5208; [elaine.debrinehowell@nmt.edu](mailto:elaine.debrinehowell@nmt.edu)) or may receive emails from her if they are struggling in class.

**Reasonable Accommodations:** New Mexico Tech is committed to protecting the rights of individuals with disabilities and providing access and full participation in the educational experience. Students with disabilities who require reasonable accommodations are invited to make their needs known to the Office for Student Access Services (SAS) as soon as possible. Accommodations are not retroactive and may take some time to implement. The process for requesting accommodations can be found at their website [https://nmt.edu/ds/for\\_students.php](https://nmt.edu/ds/for_students.php) You can contact SAS in person at the Fidel Center Room 245, call 575-835-6209, email [access@nmt.edu](mailto:access@nmt.edu) or book through the link on our website.

**Counseling Services:** The Counseling Center is very excited to announce that Tech has partnered up with the Virtual Care Group (VCG), to offer free supplemental healthcare services to our degree-seeking students. This virtual healthcare includes unlimited Tele-medical and unlimited Tele-therapy/counseling sessions available 24/7, as well as life coaching. Both in-person sessions on campus and this virtual healthcare are available for those degree-seeking students currently enrolled for Fall classes. Download The Virtual Care Group app from your app store. For questions about the platform, please email VCG's Care Team at [care@virtualcaregroup.com](mailto:care@virtualcaregroup.com). For more information on services at NMT, please call 835-6619, email [counseling@nmt.edu](mailto:counseling@nmt.edu) or check out our website at <https://www.nmt.edu/cds/>.

**Respect Statement:** New Mexico Tech supports freedom of expression within the parameters of a respectful learning environment. As stated in the New Mexico Tech Guide to Conduct and Citizenship: "New Mexico Tech's primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community."

**Title IX Reporting:** Sexual misconduct, sexual violence, and other forms of sexual misconduct and gender-based discrimination are contrary to the University's mission and core values, violate university policies, and may also violate state and federal law (Title IX). Faculty members are considered "Responsible Employees" and are required to report incidents of these prohibited behaviors. Any such reports should be directed to Tech's Title IX Coordinator (Dr. Peter Phaiiah, 238 Fidel Student Center, 575-835-5953 (O), 575-322-0001 (C), [titleixcoordinator@nmt.edu](mailto:titleixcoordinator@nmt.edu)) or reports can be filed online to Tech's Title IX ; Sexual Misconduct Report. Please visit Tech's Title IX Website ([www.nmt.edu/titleix](http://www.nmt.edu/titleix)) for additional information and resources.

## List of Laboratory Exercises

**Wave Superposition** In this Lab exercise, we investigate standing waves on a string under tension to introduce the concept of superposition. Superposition is at the base of the study of electromagnetic phenomena and will be investigated in that context in a later lab.

**Oscilloscopes** This lab is a tutorial on oscilloscopes. It is introduced here in preparation for some of the labs dealing with signals that change in time. Nevertheless, it gives you hands-on practice with wave concepts like amplitude and frequency. The important concept of Voltage and its relationship to work is introduced later in the semester, but here it is used as an example of a time-varying signal.

**Coulomb's Law** In this lab, we investigate Coulomb's law using a torsion balance to measure the repulsion force between two charged spheres.

**Electric Field and Superposition Principle** This exercise uses a computer simulation to explore further the concept of superposition in the context of electricity. In particular, we study the resultant electric field from various charge configurations.

**Electric Field Mapping** This Lab exercise uses the electric equipotential lines to map the electric field produced by an electrode configuration.

**Capacitors and Dielectrics** In this lab, we use an LCR meter to measure the value of the capacitance for various geometries and the effective capacitance for capacitors connected in series and parallel. In addition, the effect of a dielectric material inside the parallel plate capacitor is also explored.

**Ohm's Law** In this lab, the relationship between the voltage across, and the current flowing through, a so-called Ohmic material is explored. The measuring techniques developed in this lab will be essential in the following labs.

**Kirchhoff's Laws** This lab explores the Kirchhoff's loop and node laws using direct current circuits. In this context, we also examine the voltage divider, a simple but widely used circuit.

**Magnetic Forces** This experiment investigates the magnetic field produced by an electrical current and the force exerted on moving charge by a magnetic field. These effects are described respectively by Ampere's Law and the magnetic force law. Furthermore, a hands-on demonstration of applying the right-hand rule is provided.

**Magnetic Forces II** In this lab, we investigate the magnetic force on individual charges. In the process, we estimate the charge-to-mass ratio for electrons.

**Faraday's Law** In this lab, Faraday's Law is applied to determine the magnetic field in a permanent magnet's gap and the inside of a solenoid.

**Mutual Inductance** In this Lab, we investigate the Mutual Inductance between two coils in a concentric configuration.

**Displacement Current** In this Lab, we investigate the displacement current through a Capacitor in an LR-circuit. We compare the displacement and conduction current in this circuit.